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I hereby declare and state that I am knowledgeable of each of the Japanese and English languages and that I made and reviewed the attached translation of the attached Patent Application Serial No. 10-019711 filed on January 30, 1998, from the Japanese language into the English language, and that I believe my attached translation to be accurate, true and correct to the best of my knowledge and ability.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Date: March 5, 2002

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10 Date of Application: January 30, 1998
Application Number: Japanese Patent Application
No. HEI-10-019711
Applicant(s): BROTHER KOGYO KABUSHIKI KAISHA

15

November 27, 1998

Signed and Stamped by TAKESHI ISAYAMA Commissioner, Patent Office
Certificate Number HEI-10-3095096

[Title of Document] Patent Application

[Reference Number] 97335000

[Date of Filing] January 30, 1998

[To] (Commissioner of Patent Office)

5 [International Patent Code] H04N 1/387

[Title of the Invention] Image Forming Apparatus, Image Data Processing Apparatus,
and Storage Medium

[Number of Claims] 007

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[Designation of Charge]

[Ledger No. for Prepayment] 007102

25 [Amount of Payment] *

[List of Documents Attached]

[Title of Document] Specification 01

[Title of Document] Drawing 01

[Title of Document] Abstract 01

30 [Registration No. of General Power of Attorney] 9006582

[Title of the Document] Specification

[Title of Invention] Image Forming Apparatus, Image Data Processing Apparatus, and Storage Medium

[Claims for the Patent]

5 [Claim 1] An image forming apparatus that comprises image forming means that forms an image on a recording medium, receiving means that receives image data via a communication line, and print data creation means that creates print data for driving and controlling the image forming means based on the image data received by the receiving device, comprising:

10 first judging means that judges whether the image data received by the receiving means belongs to data divided into a plurality of pieces;

 storage means that stores the received data therein, without providing the image data to the print data creation means, when the first judging means judges that the received data belongs to the data divided into the plurality of pieces;

15 second judging means that judges whether the data stored in the storage means has accumulated a predetermined amount; and

 restoration means that restores the data divided into the plurality of pieces into undivided original data from the stored data and provides the restored data to the print data creation means, when the second judging means judges that the data stored in the storage means has accumulated the predetermined amount.

20 [Claim 2] The image forming apparatus claimed in claim 1, characterized in that the second judging means judges whether the image data has accumulated the predetermined amount sequentially from a first piece of the data divided into the plurality of pieces.

25 [Claim 3] An image data processing apparatus that comprises receiving means that receives image data sent through a communication line, via accumulating means that temporarily accumulates the image data, and print data creation means that creates print data for driving and controlling image forming means that formed an image on a recording medium based on the image data received by the receiving means, comprising:

30 first judging means that judges whether the received image data belongs to the data divided into a plurality of pieces;

 second judging means that judges whether the data stored in the storage means has accumulated a predetermined amount when the first judging means judges that the image data belongs to the data divided into the plurality of pieces;

35 reception directing means that directs the receiving means to receive the predetermined amount of the image data when the second judging means judges that the image data has accumulated the predetermined amount; and

 restoration means that restores the predetermined amount of image data

received by the receiving means into undivided original data and provided the data to the print data creation means.

[Claim 4] The image data processing apparatus claimed in claim 3, characterized in that the second judging means judges whether the image data has accumulated the predetermined amount sequentially from a first piece of the data divided into the plurality of pieces in the accumulating means.

[Claim 5] An image forming apparatus comprising:
the image data processing apparatus claimed in claim 3 or 4; and
image forming means that forms an image on a recording medium based on print data created by print data creation means in the image data processing apparatus.

[Claim 6] A storage medium storing a computer program for controlling an image forming apparatus comprising receiving means that receives image data via a communication line and image forming means that forms an image on a recording medium, the computer program comprising:

print data creation processing that creates print data for driving and controlling the image forming means based on the image data received by the receiving device;

first judging processing that judges whether the image data received by the receiving means belongs to data divided into a plurality of pieces;

storage processing that stores the received data, without providing the image data to the print data creation means, when the first judging means judges that the received data belongs to the data divided into the plurality of pieces;

second judging processing that judges whether the data stored in the storage means has accumulated a predetermined amount; and

restoration processing that restores the data divided into the plurality of pieces into undivided original data from the stored data and provides the restored data to the print data creation means, when the second judging means judges that the data has accumulated the predetermined amount.

[Claim 7] A storage medium storing a computer program for controlling an image forming apparatus comprising receiving means that receives image data sent through a communication line via accumulating means that temporarily accumulates the image data, and image forming means that forms an image on a recording medium, the computer program comprising:

print data creation processing that creates print data for driving and controlling the image forming means based on the image data received by the receiving device;

first judging processing that judges whether the received image data belongs to the data divided into a plurality of pieces;

second judging processing that judges whether the data has accumulated a predetermined amount in the accumulating means when the first judging means judges that the image data belongs to the data divided into the plurality of pieces;

reception directing processing that directs the receiving means to receive the predetermined amount of the image data when the second judging means judges that the image data has accumulated the predetermined amount; and

restoration processing that restores the predetermined amount of image data received by the receiving means into undivided original data and provided the restored data to the print data creation means.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The invention relates to an image forming apparatus that forms an image on a recording medium based on image data sent via a communication line, an image data processing apparatus that processes the image data, and a storage medium that embodies the image forming apparatus and the image data processing apparatus, and more particularly, pertains to an image forming apparatus that has a feature in processing when receiving image data divided into a plurality of pieces, an image data processing apparatus, and a storage medium.

[0002]

[Prior Art]

There have been conventionally provided image forming apparatuses that include an image forming means that forms an image on a recording medium, a receiving means that receives image data via a communication line, and a print data creation means that creates print data for driving and controlling the image forming means based on the image data received by the receiving means. In the image forming apparatus of this type, the receiving means, such as a receiving buffer, receives image data via the communication line, and then, the print data creation means, such as a CPU, creates print data for driving and controlling the image forming means, such as a printer engine. Thus, the image forming means forms an image on a recording medium based on the print data, so that the image, corresponding to the image data received via the communication line, can be obtained. Recent years have seen significant advances in the personal computer communications technology, for example, communications using the Internet. Thus, image forming apparatuses capable of receiving image data using E-mail and the like are conceivable.

[0003]

[Problems to be Solved by the Invention]

However, general image data in the form of E-mail, without being any processed, is generally very large. Thus, if the image data is sent and received as it is, the performance of the entire communications system may be affected. To reduce the amount of the data in each E-mail, it is conceivable that the image data is divided into a plurality of pieces and the divided image data are sent as pieces of E-mail. In this case,

however, the image forming apparatus, such as a printer, forms an image in random arrangements, using the plurality of pieces of the image data corresponding to the received E-mail.

[0004]

5 Therefore, depending on the situation, there may be cases where it is impossible to image how an original image looks like. In particular, E-mail is delivered via various routes, and there are numbers of providers that relay the E-mail. As a result, the sequence of the divided pieces of image data may be changed, or unrelated E-mail may be placed between the divided pieces of image data. In this case, it is much more
10 difficult to restore the original image.

[0005]

Therefore, it is an object of the invention to readily restore an original data in an image forming apparatus that receives image data divided into pieces via a communication line, and an image data processing apparatus.

15 [0006]

[Means for Solving the Problems and Effects of the Invention]

The invention claimed in claim 1, which is made in order to achieve the above object, is an image forming apparatus that comprises image forming means that forms an image on a recording medium, receiving means that receives image data via a
20 communication line, and print data creation means that creates print data for driving and controlling the image forming means based on the image data received by the receiving device. The image forming apparatus includes first judging means that judges whether the image data received by the receiving means belongs to data divided into a plurality of pieces, storage means that stores the received data therein, without providing the image
25 data to the print data creation means, when the first judging means judges that the received data belongs to the data divided into the plurality of pieces, second judging means that judges whether the data stored in the storage means has accumulated a predetermined amount, and restoration means that restores the data divided into the plurality of pieces into undivided original data from the stored data and provides the
30 restored data to the print data creation means, when the second judging means judges that the data stored in the storage means has accumulated the predetermined amount.

[0007]

In the invention structured as described above, the first judging means judges that the image data belongs to the image data provided into pieces when the receiving
35 means receives the image data provided into pieces via the communication line. At that time, the storage means stores the image data therein without providing the image data to the print data creation means. Then, the second judging means judges whether the image data in the storage means has accumulated a predetermined amount. When the second judging means judges that the image data has accumulated the predetermined

amount, the restoration means restores the image data into undivided image data and send it to the print data creation means. Then, the print creation means creates print data for driving and controlling the image forming apparatus, based on the restored image data.

5 [0008]

As described above, in the invention, the image data received by the receiving means is stored in the storage means until they has accumulated the predetermined amount. When the image data has accumulated the predetermined amount, the image data is restored into the undivided image data, and the data is used to drive and control the image forming means. Accordingly, in the invention, an image can be formed by the predetermined amount of the image data, using the image forming means, and an original image can be readily restored.

[0009]

Further, in the invention, the storage means for storing divided pieces of image data and the restoration means for restoring the undivided original image data are integrated in the image forming apparatus. Accordingly, in the invention, the restoration of the undivided original image data can be accomplished by the image forming apparatus alone, without an aid of another computer. Thus, in the invention, the computer in the communication system is free from the restoration processing, and the performance of the entire communication system can be enhanced.

[0010]

It is noted that a predetermined amount of image data can be defined variously. For example, image data for one page or a piece of divided image data can be considered as a predetermined amount. Alternatively, if image data contains character strings indicating a drawing, such as "FIG. 1, and "FIG. 2", and carriage return data indicating a paragraph, a block separated by such character "image data" used herein means not only data in an image file, such as data transmitted by a fax machine, but also data written in a page description language.

[0011]

The invention claimed in claim 2 is characterized in that the second judging means judges whether the image data has accumulated the predetermined amount sequentially from a first piece of the data divided into the plurality of pieces, in addition to the structure claimed in claim 1.

In the invention, the second judging means judges whether the image data has accumulated the predetermined amount sequentially from a first piece of the data divided into the plurality of pieces. When the image data has accumulated the predetermined amount sequentially from a first piece of the data divided into the plurality of pieces, the restoration means restores undivided image data. Thus, in the invention, an image can be formed, sequentially from a first piece of the data divided into the plurality of pieces,

by the predetermined amount of the image data, using the image forming means. Accordingly, in addition to the effects of the invention claimed in claim 1, the effect that the original image can be further readily restored is produced.

[0012]

5 Further, the image is formed sequentially from the top, so that the original image can be restored even when a smaller unit amount is used as a predetermined data amount. For example, a predetermined length or predetermined lines of the image is defined as a predetermined data amount. Using this reference, the original image can be readily restored sequentially using the image forming means. This will reduce the
10 storage capacity required in the storage means, resulting in an efficient reduction of the manufacturing cost of the image forming apparatus.

[0013]

The invention claimed in claim 3 is an image data processing apparatus that includes receiving means that receives image data sent through a communication line,
15 via accumulating means that temporarily accumulates the image data, and print data creation means that creates print data for driving and controlling image forming means that formed an image on a recording medium based on the image data received by the receiving means. The image data processing apparatus includes first judging means that judges whether the received image data belongs to the data divided into a plurality of
20 pieces, second judging means that judges whether the data stored in the storage means has accumulated a predetermined amount when the first judging means judges that the image data belongs to the data divided into the plurality of pieces, reception directing means that directs the receiving means to receive the predetermined amount of the image data when the second judging means judges that the image data has accumulated the
25 predetermined amount, and restoration means that restores the predetermined amount of image data received by the receiving means into undivided original data and provided the data to the print data creation means.

[0014]

In the invention structured as described above, the receiving means that receives
30 image data sent through the communication line, via the accumulating means that temporarily accumulates the image data. When the divided pieces of data has accumulated the predetermined amount, the first judging means judges that the image data belongs to the image data divided into pieces. At that time, the second judging means judges whether the image data has accumulated the predetermined amount in the
35 accumulating means. When the second judging means judges that the image data has accumulated the predetermined amount, the reception directing means directs the receiving means to receive the predetermined amount of the image data. The restoration means restores the predetermined amount of image data received by the receiving means into undivided original data and provided the data to the print data

creation means. Then, the print data creation means creates print data for driving and controlling the image forming means, based on the restored image data.

[0015]

As described above, in the invention, the image data is stored in the
5 accumulating means until they has accumulated the predetermined amount. When the
image data has accumulated the predetermined amount, the receiving means receives the
image data. Then, the image data is restored into the undivided image data, and the
data is used to drive and control the image forming means. Accordingly, if the image
forming means is driven and controlled using print data created using the invention, an
10 image can be formed by the predetermined amount of the image data, using the image
forming means, and an original image can be readily restored.

[0016]

It is noted that a predetermined amount of image data can be defined variously.
For example, image data for one page or a piece of divided image data can be considered
15 as a predetermined amount. Alternatively, if image data contains character strings
indicating a drawing, such as "FIG. 1, and "FIG. 2", and carriage return data indicating a
paragraph, a block separated by such character "image data" used herein means not only
data in an image file, such as data transmitted by a fax machine, but also data written in
a page description language.

20 [0017]

The invention claimed in claim 4 is characterized in that the second judging
means judges whether the image data has accumulated the predetermined amount
sequentially from a first piece of the data divided into the plurality of pieces in the
accumulating means.

25 In the invention, the second judging means judges whether the image data has
accumulated the predetermined amount sequentially from a first piece of the data divided
into the plurality of pieces, in the accumulating means. When the image data has
accumulated the predetermined amount sequentially from a first piece of the data divided
into the plurality of pieces, the reception directing means orders reception of the image
30 data. Thus, if the image forming means is driven and controlled by the print data
created using the invention, an image can be formed, sequentially from a first piece of
the data divided into the plurality of pieces, by the predetermined amount of the image
data, using the image forming means. Accordingly, in addition to the effects of the
invention claimed in claim 3, the effect that the original image can be further readily
35 restored is produced.

[0018]

Further, the image is formed sequentially from the top, so that the original
image can be restored even when a smaller unit amount is used as a predetermined data
amount. For example, a predetermined length or predetermined lines of the image is

defined as a predetermined data amount. Using this reference, the original image can be readily restored sequentially using the image forming means. This will reduce the volume of image data to be accumulated in the accumulating means, and other communication using the accumulating means can be further smoothly implemented.

5 [0019]

An image forming apparatus claimed in claim 5 includes the image data processing apparatus claimed in claim 3 or 4, and image forming means that forms an image on a recording medium based on print data created by print data creation means in the image data processing apparatus.

10 [0020]

That is, the image forming apparatus of the invention includes image forming means that forms an image on a recording medium based on print data created by print data creation means in the image data processing apparatus. The image data processing apparatus claimed in claim 3 or 4 including the print data creation means is integrated in the image forming apparatus. Accordingly, in the invention, the restoration of the undivided original image data can be accomplished by the image forming apparatus alone, without an aid of another computer. Thus, in the invention, the computer in the communication system is free from the restoration processing, and the performance of the entire communication system can be enhanced, in addition to the effect of claim 3 or 4 of the invention.

20

[0021]

Further, in the invention, the image data is stored in the accumulating means until the image data accumulates a predetermined amount. Accordingly, in addition to the effects of claim 1 or 2 of the invention, the storage capacity required in the image forming apparatus is further reduced, resulting in a further reduction of the manufacturing cost of the image forming apparatus.

25

[0022]

The invention claimed in claim 6 is a storage medium storing a computer program for controlling an image forming apparatus comprising receiving means that receives image data via a communication line and image forming means that forms an image on a recording medium. The computer program includes print data creation processing that creates print data for driving and controlling the image forming means based on the image data received by the receiving device, first judging processing that judges whether the image data received by the receiving means belongs to data divided into a plurality of pieces, storage processing that stores the received data, without providing the image data to the print data creation means, when the first judging means judges that the received data belongs to the data divided into the plurality of pieces, second judging processing that judges whether the data stored in the storage means has accumulated a predetermined amount, and restoration processing that restores the data

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divided into the plurality of pieces into undivided original data from the stored data and provides the restored data to the print data creation means, when the second judging means judges that the data has accumulated the predetermined amount.

[0023]

5 Accordingly, if the image forming apparatus is controlled based on the computer program stored in the invention, the print data creation means, the first judging means, the storage means and the second judging means, each of which is claimed in claim 1, and the print data creation processing corresponding to the restoration means, the first judging processing, the storage processing, the second judging processing, and
10 the restoration processing can be executed. Therefore, in the invention, effects similar to those of claim 1 of the invention can be produced using various computers that controls the image forming means in the image forming apparatus.

[0024]

 The invention claimed in claim 7 is a storage medium storing a computer
15 program for controlling an image forming apparatus comprising receiving means that receives image data sent through a communication line via accumulating means that temporarily accumulates the image data, and image forming means that forms an image on a recording medium. The computer program includes print data creation processing that creates print data for driving and controlling the image forming means based on the
20 image data received by the receiving device, first judging processing that judges whether the received image data belongs to the data divided into a plurality of pieces, second judging processing that judges whether the data has accumulated a predetermined amount in the accumulating means when the first judging means judges that the image data belongs to the data divided into the plurality of pieces, reception directing
25 processing that directs the receiving means to receive the predetermined amount of the image data when the second judging means judges that the image data has accumulated the predetermined amount, and restoration processing that restores the predetermined amount of image data received by the receiving means into undivided original data and provided the restored data to the print data creation means.

30 [0025]

 Accordingly, if the image forming apparatus is controlled based on the computer program stored in the invention, the print data creation means, the first judging means, the second judging and the reception directing means, each of which is claimed in claim 3, and the print data creation processing corresponding to the restoration means,
35 the first judging processing, the second judging processing, the reception directing processing and the restoration processing can be executed. Therefore, in the invention, effects similar to those of the invention claimed in claim 3 can be produced using various computers that controls the image forming means in the image forming apparatus. Further, if the second judging processing of the invention is put the same restriction as

the second judging means claimed in claim 4, the effects similar to those of the invention claimed in claim 4 can be produced.

[0026]

[Embodiments of the Invention]

5 Next, an embodiment of the invention will be described with reference to the drawings. FIG. 1 shows an overall configuration of a printing system 2 to which the invention is applied. As shown in FIG. 1, in the printing system 2, a computer system 8 on the E-mail transmitting side, which primarily includes a personal computer (hereinafter referred to as a PC) 4 and a printer 6, and a printer 22, as an image forming
10 apparatus, are connected to the Internet 28 via mail servers 24, 26. The printer 22 includes a printing unit 29, as an image forming means, for printing (forming) an image on a recording medium, such as recording paper, and a control unit 10, as an image data processing apparatus, for driving the printing unit 29 via a printer driver 30 described later. The control unit 10 mainly consists of a well-known microcomputer including a
15 CPU 10a, a ROM 10b, a RAM 10c, and the like.

[0027]

 The mail server 24 is provided by a so-called Internet service provider, while the mail server 26 is connected to the printer 22 in a particular enterprise. In a description given hereinafter, it is assumed that the computer system 8 transmits various
20 types of E-mail to the Internet 28 via the mail server 24 using the SMTP (Simple Mail Transfer protocol).

[0028]

 First, an operator in the E-mail transmitting side transmits ordinary mail in text format using mailing software that is run on the PC 4. In another case, the operator
25 creates an image s/he desires to transmit to a recipient using an application program, such as word processing software, spreadsheet software, or graphics software, and then creates a print file in a desired format from the created image through a printer driver (not shown) integrated into the PC 4. This print file is written in a specified page description language (e.g. de facto standards for printer control language system, such as
30 PCL, PostScript, and GDI), and can be confirmed by printing out the file using the printer 6 connected to the PC 4. The operator attaches the print file to the mail and transmits it to the recipient using the mailing software.

[0029]

 When the operator desires to send a created image to one recipient using a
35 facsimile machine and the same image to another recipient as E-mail, first, the operator in the E-mail transmitting side selects a facsimile driver (not shown), instead of the printer driver. Then, a fax data file is created in a format that is the same as the format when the file is actually transmitted by the facsimile machine through the facsimile driver (a data format such as G3 and TIFF). Then, the operator sends the fax data file

by attaching it to E-mail using the mailing software.

[0030]

Further, when there is input from an image reading apparatus not shown, such as an image scanner, into the PC 4, image data read from the apparatus is converted into a file in a specified data format (a standardized format, such as TIFF and JPEG). The file is transmitted as a file attached to mail in a like manner. The image files containing fax data or image data can be effectively outputted when the printer 22 on the recipient side has the capability of analyzing the data.

[0031]

A data file of any type, including files written in the page description language, contains high volumes of data, so that there may be a case where it is inappropriate to transmit such a data file as one file. In such a case, the operator should divide the data file into a plurality of files and attach data including identifying information representing a state of division, such as 1/4, 2/4, 3/4, and 4/4 (when the data file is divided into four pieces), to each of the divided files. Dividing the data file and attaching such data may be executed automatically by the PC 4. A divided data file, to which data identified as m/n (m and n are natural numbers) is attached (hereinafter referred to as m/n data), corresponds to a divided piece of image data. Various types of m/n data can be used unless the data represents the substantially same information as the m/n data.

[0032]

When mail is transmitted as described above, the mailing software requires the operator to enter various required information, for example, the SMTP used by the mail server 24, the address of the mail server 24, the recipient's address, a subject of the mail. Also, the mailing software prepares a mail header according to the information entered. As described above, when data files in various formats are attached to E-mail, an identifier representing the attribute of the attached file(s) is also added to the mail header as the file information.

[0033]

Finally, the mailing software creates E-mail 70, as shown in FIG. 2, by adding an envelope 71, the header 73 to a body 75 containing a message in text format and/or various attached files, and transmits the E-mail 70 to the mail sever 24. The m/n data is also written in the header 73. When a data file corresponding to an image (or character strings) spreading over pages are divided into a plurality of files, as described above, each of which contains data for one page, data showing the end of each page is also written in the header 73.

[0034]

As shown in a control block diagram of FIG. 3, E-mail (ordinary mail and print mail) transmitted in accordance with the SMTP over the Internet 28 is received by an SMTP server 32 of the mail server 26. E-mail addressed to the mail server 26 is stored

in a mail spool 34, as an accumulating means, while other mail is transmitted again to the Internet 28.

[0035]

On the other hand, the printer 22 includes a mail receiving and printing utility 31 that receives mail from the mail server 26 and directs the printer driver 30 described later according to the format of the data contained in the mail, and the printer driver 30 that converts print data written in a particular page description language and fax data into image data that can be processed by the printing unit 29. The printer driver 30 has at least one type of emulation function for analyzing the aforementioned various page description languages and converting it into image data. The printer driver 30 may have a plurality of emulation functions if required. In addition to the emulation function for the page description languages for the printer, if processing programs are added to the printer driver 30, it may have a FAX emulation function for analyzing FAX data and converting it into image data, as well as a conversion function for analyzing a predetermined compressed image data and converting it into image data.

[0036]

The control unit 10, including the mail receiving and printing utility 31 and the printer driver 30, also includes storage space (e.g. the ROM 10b) for managing fonts needed to print text data, and another storage space (e.g. the RAM 10c) for managing printing forms. The mail receiving and printing utility 31 analyzes the mail header of the received mail, checks if the received mail contains an attached file(s), and if so, analyzes the attribute of the attached file(s). Then, the utility 31 directs the print driver 30 according to the results of the analysis.

[0037]

For example, when the utility 31 judges that text data of a message of ordinary mail is received, the utility 31 reports to that effect to the printer driver 31, and the printer driver 30 converts the text data into image data in a specified format according to a font and a printing foam stored in the control unit 10, and outputs the image data to the printing unit 29.

[0038]

When the utility 31 judges that the received E-mail contains an attached file having m/n data, which is one of a divided pieces of data, the data in each file is combined with each other, as described next, to restore the original data and output the restored original data to the printing unit 29. Next, processing of the mail receiving and printing utility 31 executed by the control unit 10 of the printer 22 will be described with reference to a flowchart of FIG. 3.

[0039]

When the processing is started, the mail receiving and printing utility 31 executes S1 (S stands for a step, hereinafter) and obtains access to a POP server 38

within the mail server 26 to check if any mail has arrived. At this time, when there is E-mail addressed to the printer 22 among E-mail stored in the mail spool 34, the POP server 38 provides information of the E-mail to the control unit 10.

[0040]

5 When there is E-mail, the processing goes to S3. When there is no E-mail, the processing remains at S1. S1 is not necessarily continuously executed, it just needs to be executed at a specified time interval as an interrupt routine. Therefore, the control unit 10 is allowed to execute other processing related to the printer 22 during S1.

[0041]

10 When there is E-mail in the mail server 26 (S1: YES), the processing goes to S3, and the printer 22 receives the E-mail from the mail server 26. That is, at S3, the mail receiving and printing utility 31, as a POP client 36, makes a request to the POP server 38 within the mail server 26 for E-mail addressed to the POP client 36. Responding to the request, the POP server 38 transmits the E-mail, according to POP3 (post Office
15 Protocol, ver. 3), from the mail spool 34 to a mail box 40 prepared for the mail receiving and printing utility 31.

[0042]

 At S5, it is judged whether the E-mail received at S3 contains data divided into a plurality of pieces. This judgment is made by checking whether m/n data described
20 above is contained, for example. When the received E-mail contains no divided data (S5: NO), the processing goes to S7. The printer driver 30 is directed to print an image corresponding to the data of the E-mail, and then the processing returns to S1. Then, the printer driver 30 analyzes the data of the E-mail and outputs the corresponding print data to drive the printing unit 29. As a result, the image corresponding to the data of
25 the E-mail received at S3 can be formed on a recording sheet.

[0043]

 On the other hand, when the E-mail received at S3 contains data divided into the plurality of pieces (S5: YES), the processing goes to S11, where it is judged whether the divided mail data has accumulated a predetermined amount. The predetermined
30 amount of mail data may be determined by various references. For example, data for one page, or all the divided pieces of data (i.e. a full set of data from 1/n to n/n) can be defined as a predetermined amount. Alternatively, if a drawing number such as "FIG. 1" and "FIG. 2" or carriage return data indicating a paragraph are included in the mail data, a block separated by such a drawing number or carriage return data can be the
35 predetermined amount. The reference used for the judgment may be preset, or set through an operation panel not shown. An optimum reference may be set automatically depending on the format of an attached file.

[0044]

 When it is judged that the predetermined amount of the mail data has not

accumulated at S11 (S11: NO), the currently accumulated mail data is stored in the RAM 10c at S13, and the processing returns to S1. When other mail arrives at the POP server 38 (S1: YES), S3 and the following steps are executed.

[0045]

5 As the above-described steps are repeated, the predetermined amount of mail data accumulates by adding the data received at S3 to the data stored at S13. When the predetermined amount of the mail data has accumulated, an affirmative judgement is made at S11. Then, the processing goes to S15, and the predetermined amount of divided mail data is combined into the undivided original data file. After that, the
10 processing goes to S7 described above. As a result, an image corresponding to the predetermined amount of mail data can be formed on a recording sheet.

[0046]

 As described above, the printer 22 keeps storing received mail data in the RAM 10c until it reaches the predetermined amount (S13). When the received mail data is
15 accumulated the predetermined amount, the printer 22 combines the divided mail data into the undivided data file (S15) and prints the image (S7). Accordingly, the printer 22 can restore the original image readily from the mail data received even though the mail data is received as a plurality of divided pieces of E-mail. Further, in the embodiment, the above-described processing is executed within the printer 22 without the aid of a
20 computer connected to the printer 22. Consequently, a computer can be free from the processing related to the mail data combination, and this will enhance the processing efficiency of the entire communication system.

[0047]

 The judgement made as to whether the divided mail data has accumulated a
25 predetermined amount (S15) may be altered such that an affirmative judgment is made only when the divided mail data has accumulated a predetermined amount sequentially from the top. This is accomplished when an affirmative judgment is made at S15 for the first time after mail data attached with 1/n data of m/n data has been received. In this case, since an image is printed sequentially from the top according to the mail data,
30 the original image can be restored more easily. In addition, the original image can be readily restored even when a smaller unit amount is used as a predetermined data amount. For example, a predetermined length or predetermined lines of the image is defined as a predetermined data amount. This will also reduce the storage capacity required in the RAM 10c, resulting in an efficient reduction of the manufacturing cost of the printer 22.

35 [0048]

 When two or more unrelated pieces of E-mail having the same denominator (n) are received at the same time, they are likely to be mixed up. To eliminate this problem, an ID code may be added to each piece of E-mail, and judgment may be made at S15 as to whether the mail data having the same ID code has accumulated a predetermined

amount. By doing so, a plurality of unrelated pieces of E-mail can be surely prevented from being mixed up.

[0049]

Further, in the above-described embodiment, the received pieces of mail data combined together into the undivided original data file when they have been stored in RAM 10c and reach a predetermined amount. Alternatively, the mail data may be stored in the mail spool 34 until the mail data accumulates the predetermined amount.

[0050]

Next, an embodiment of such an embodiment will be described. FIG. 5 is a flowchart showing another embodiment of the processing executed by the mail receiving and printing utility 31. In this processing, first, the mail receiving and printing utility 31 obtains access to the POP server 38 and checks if there is E-mail in the mail server 26 at S51, in the same way as at aforementioned S1. If not (S51: NO), the processing remains at S51. When there is E-mail (S51 YES), the process goes to S53, where it is judged whether the mail contains data divided into a plurality of pieces. When the mail contains no divided data (S53: NO), the printer 22 received the E-mail at S55 in the same way as at S3.

[0051]

On the other hand, when the mail in the mail server 26 contains divided data (S53: YES), it is judged whether the divided mail data has accumulated a predetermined amount in the mail spool 34 (S57). The processing at S51 and S53 is repeated until the divided mail data accumulates the predetermined amount. When the mail data has accumulated the predetermined amount in the mail spool 34 (S57: YES), the processing goes to aforementioned S55, and the printer receives the E-mail.

[0052]

After the printer 22 receives the E-mail at S55, the divided mail data is combined in the same way as at S15 (i.e. when a negative judgment is made at S53, this processing is skipped), and printing is performed at S63 in the same manner as at S7. In this processing, the divided mail data is stored in the mail spool 34 until it accumulates a predetermined amount (S57), and the printer 22 receives the data when accumulates the predetermine amount (S55) and combines the divided mail data to restore the undivided data file (S61). Then, printing is performed (S63). Accordingly, the original image can be readily restored from the mail data received even when the mail server 26 receives a plurality of mail data divided into pieces of E-mail.

[0053]

Further, in this embodiment, these processing are executed within the printer 22 without aid of a computer connected to the printer 22. Accordingly, a computer can be free from the processing related to the mail data combination, and this will enhance the processing efficiency of the entire communication system. Further, in this embodiment,

the printer 22 does not receive E-mail before mail data accumulates the predetermined amount. This further reduces the storage capacity required in the RAM 10c, so that the manufacturing cost of the printer 22 can be further reduced. In this embodiment, also, as described above, various references are conceivable for the predetermined amount of mail data.

[0054]

In this processing, the judgment made at step S57 may be altered such that an affirmative judgment is made only when the mail data has accumulated a predetermined amount sequentially from the top. In this case, since an image is printed sequentially from the top according to the mail data, the original image can be restored more easily. In addition, the original image can be readily restored even when a smaller unit amount is used as a predetermined data amount. For example, a predetermined length or predetermined lines of the image is defined as a predetermined data amount. In this case, the amount of electric mail to be stored in the mail spool 34 can be reduced and other communication through the mail server 26 can be further smoothly performed.

[0055]

In each embodiment described above, the processing executed at S7 and in the printer driver 30, the processing at S5, the processing at S11, the processing at S13, and the processing at S15 correspond to print data creation processing claimed in claim 6, first judging processing claimed in claim 6, second judging processing claimed in claim 6, storage processing claimed in claim 6, and restoring processing claimed in claim 6, respectively. The processing executed at S63 and in the printer driver 30, the processing at S53, the processing at S57, the processing at S55, and the processing at S61 correspond to print data creation processing claimed in claim 7, first judging processing claimed in claim 7, second judging processing claimed in claim 7, reception directing processing claimed in claim 7, and restoring processing claimed in claim 7, respectively.

[0056]

The CPU 10a in the control unit 10 executing each processing described above and the storage space of the ROM 10b in the control unit 10 storing each program for each processing, each correspond to print data creation means, first judging means, second judging means, storage means and restoring means, each of which is claimed in claim 1 or dependent claims therefrom, or print data creation means, first judging means, second judging means, receiving and directing means and restoring means, each of which is claimed in claim 3 and dependent claims therefrom. Further, the RAM 10c corresponds to storage means claimed in claim 1 or dependent claims therefrom, and the receiving buffer not shown of the control unit 10 corresponds to receiving means claimed in each claim.

Further, the invention is not restricted to the aforementioned embodiments,

various changes may be made therein to embody the invention without departing from the spirit of the invention. For example, various storage mediums are conceivable as a storage medium for the invention, other than ROMs and RAMs. For example, a CD-ROM, a floppy disk, a magneto-optic disk, a hard disk, or a file server on the Internet may be used.

[0057]

Although, in each embodiment described above, the program stored in the storage medium of the invention is read into the control unit 10 of the printer 22, the storage medium claimed in claim 7 may be read into a device, such as a printer server and a personal computer, that outputs print data to the printer, not being restricted to an image forming apparatus. In this case, the print server, the personal computer and the like constitute an image data processing apparatus of claim 3 or 4. Further, the storage medium of the invention is not necessary to be one, but is may be provided two or more. For example, in the storage medium claimed in claim 7, a program for the first judging processing to the reception directing processing (S51 to S55) or the first judging processing to restoring processing (S51 to S61) may be stored in a storage medium readable by a personal computer or a print server, and a program for the restoration processing and the printing data creation processing (S61, S63) or the only restoration processing may be stored in a storage medium readable by a printer.

[Brief Description of Drawings]

[FIG. 1]

A block diagram showing an overall configuration of a printing system to which the invention is applied.

[FIG. 2]

An explanatory diagram showing a structure of mail handled by the printing system.

[FIG. 3]

A block diagram of a control sequence for a receiving side of the printing system.

[FIG. 4]

A flowchart showing processing of a mail receiving and printing utility of the printing system.

[FIG. 5]

A flowchart showing another embodiment of the mail receiving and printing utility.

[Description of Symbols]

2 ... printing system	10 ... control unit	10a ... CPU
10b ... ROM	10c ... RAM	22 ... printer
26 ... mail server		
28 ... Internet	29 ... printing unit	30 ... printer driver

31 ... mail receiving and printing utility	32 ... SMTP server
34 ... mail spool	36 ... POP client
40 ... mail box	38 ... POP server

[Title of the Document] Abstract

[Abstract]

[Problem to be Solved]

5 To readily restore an original image in an image forming apparatus that receives
an image data divided into pieces via a communication line and an image data processing
apparatus.

[Solution]

10 When E-mail (image data) received at processing of S1 and S3 belongs mail
data divided into pieces (S5:YES), the received mail data is stored in a RAM until the
received data accumulates a predetermined amount (S13). When the mail data has
accumulated the predetermined amount (S11:YES), the mail data is combined into
undivided data file (S15) and the data file is printed (S7). Thus, an original image can
be readily restored even when mail data divided into a plurality of E-mail.

[Selected Drawing] Figure 4

[Title of Document] Official Correction Data
[Corrected Document] Patent Application

<Identified Information / Additional Information>

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